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11 UNITED STATES DISTRICT COURT

12 NORTHERN DISTRICT OF CALIFORNIA

13 AliveCor, Inc.,

14 Plaintiff,

15 vs.

16 Apple Inc.,

17 Defendant.

CASE NO. 21-cv-03958-JSW

FIRST AMENDED COMPLAINT

JURY TRIAL DEMANDED

1 **I. INTRODUCTION**

2 1. When Apple Inc. (“Apple”) first released the Apple Watch in 2015, it presented the
3 new device, a smartwatch, primarily as a high-tech fashion accessory. The first Apple Watch came
4 in multiple colors—several with gold plate—and the biggest features Apple advertised were the
5 Watch’s multiple different types of band, all of which were decorative in nature. Although the first
6 version of the Apple Watch included some fitness and health features, it was clear that Apple viewed
7 the Apple Watch primarily as a way for luxury and high-end watch purchasers to dress up their wrist
8 with an extension of their smartphone.

9 2. Plaintiff AliveCor, Inc. (“Plaintiff” or “AliveCor”) was an innovator that helped
10 change that perception, first for the public and then for Apple. AliveCor’s founder, Dr. Dave Albert,
11 realized that smartwatches, such as the Apple Watch, were the perfect device to monitor one’s heart
12 for potentially life-threatening conditions. Dr. Albert and AliveCor therefore went to work to
13 develop a wristband for the Apple Watch, the KardiaBand, that was capable of recording an
14 electrocardiogram (“ECG” or “EKG”).¹ Simultaneously, AliveCor developed first-of-their-kind
15 apps: (i) the Kardia app, that could analyze those readings on the Apple Watch; and (ii) a heartrate
16 analysis app powered by artificial intelligence, SmartRhythm, that could monitor a user’s heartrate
17 and alert them when there was some irregularity suggesting they should record an ECG. AliveCor
18 was open with Apple about its intentions and, in fact, Apple not only initially approved AliveCor’s
19 apps for distribution through the App Store, but also advertised AliveCor’s innovations in order to
20 sell more Apple Watches.

21 3. In 2017, after an extensive clearance process with the U.S. Food and Drug
22 Administration (“FDA”), AliveCor obtained approval to sell the KardiaBand in the U.S. Consistent
23 with its history with Apple so far (which involved multiple meetings in which AliveCor
24 demonstrated its new device’s capabilities), AliveCor informed Apple about the FDA clearance and
25 that it intended to begin selling KardiaBands shortly along with its previously-approved Kardia and
26

27 ¹ ECG readings can be used to detect whether a patient is experiencing atrial fibrillation
28 (“AFib”) or other heart-related health events.

1 SmartRhythm apps. What AliveCor did not know is that Apple had finally realized heart health
2 analysis was incredibly valuable to (and desired by) smartwatch users, and thus had been working
3 in the background to copy AliveCor's ideas—including both the ability to record an ECG on the
4 Apple Watch, as well as to provide a separate app for heartrate analysis. Apple apparently decided
5 that it needed to try to undercut AliveCor's success and, the same day AliveCor told Apple that it
6 planned to announce its FDA clearance, Apple "pre-announced" a heart initiative for the Apple
7 Watch. Apple also tried to steal AliveCor's thunder through various other public relations tactics,
8 but the irony is that Apple's demonstrated commitment to heart health on the Apple Watch validated
9 AliveCor's business concept and, as healthy competition should do, initially led to an increase in
10 AliveCor's sales and public brand awareness.

11 4. But, as it has done multiple times over the years in other markets, Apple decided that
12 it would not accept competition on the merits. Almost immediately after AliveCor started selling
13 KardiaBand and its apps, Apple began a concentrated campaign to corner the market for heartrate
14 analysis on the Apple Watch, because the value of controlling such critical health data (with the
15 accompanying ability to exploit it) was apparently too much of a temptation for Apple. Thus,
16 despite previously accepting SmartRhythm without objection (when Apple did not have designs to
17 own the market), Apple suddenly claimed that the app "violated" various unwritten App Store
18 guidelines. When AliveCor pushed back on these accusations, Apple responded by literally
19 rewriting the rules. Nevertheless, AliveCor adapted and updated SmartRhythm multiple times over
20 several months so it was in compliance with Apple's new and ever-changing guidelines.

21 5. Faced with AliveCor's tenacity, Apple next resorted to behind-the-scenes acts of
22 sabotage, consisting primarily of undocumented updates to the Apple Watch's operating system,
23 watchOS. Those unannounced updates would suddenly render SmartRhythm inoperable and were
24 out of the norm for devices like the Apple Watch (and particularly out of the norm for Apple, which
25 typically documents every minor change to its operating systems). Nevertheless, this tactic occurred
26 with unfortunate regularity throughout the first half and late summer of 2018, and AliveCor was
27 forced each time to drop everything to update its app so that its customers (who relied on
28 SmartRhythm for medical purposes) were not left without its lifesaving monitoring for too long.

1 6. In September 2018, Apple released the Series 4 Apple Watch, which included the
2 ability to record an ECG as a default app with the Watch's hardware and software. Apple also
3 released a heartrate analysis app (like SmartRhythm) that came standard on the new Apple Watch,
4 a fact that Apple heavily advertised as a selling point for the new device. Had that been the extent
5 of Apple's actions, the market would have dictated who won or lost. Apple's app came standard on
6 the Watch, which gave it an advantage, but AliveCor's SmartRhythm app was simply better at
7 identifying worrisome heart-related health events, a quality difference industry participants clearly
8 recognized. Other preexisting heartrate analysis apps offered similar functionality that consumers
9 could have selected if they thought it better than Apple's offering. But, unfortunately, Apple did
10 not allow the market to make its decision. Instead, Apple used its control over watchOS to ensure
11 that its new heartrate analysis app had no competition from the likes of AliveCor or any other
12 provider.

13 7. Apple did so by exploiting its knowledge that AliveCor and similar competitors
14 depended on watchOS's heartrate algorithm to provide them critical information for heartrate
15 analysis.² Although direct access to the Watch's sensors would have been preferable, the original
16 heartrate algorithm was transparent enough to allow third parties to meaningfully identify irregular
17 heartrates and determine whether the user likely required medical assistance. The algorithm was
18 virtually the same on the first four versions of watchOS, but, with the introduction of the Series 4
19 Apple Watch and Apple's introduction of its competing heartrate analysis app, Apple released
20 watchOS5, which, among other things, "updated" the Watch's heartrate algorithm. That update did
21 not improve the user experience for Apple Watch purchasers; instead, its purpose and effect was
22 simply to prevent third parties from identifying irregular heartrate situations and, thus, from offering
23 competing heartrate analysis apps. Even more insidiously, the update was also pushed out to Series
24 1-3 Watch users (who did not have ECG capabilities built into their Watches like Series 4 users),
25 which rendered their copies of SmartRhythm ineffective and negated the reason they purchased
26

27 ² The heartrate algorithm took readings from the Watch's sensors and converted them into
28 heartrate information.

1 KardiaBands and AliveCor’s other apps. In short, to gain an unfair competitive edge, Apple put
2 countless AliveCor users’ lives in danger.

3 8. Faced with the reality that, due to Apple’s exclusionary conduct, SmartRhythm could
4 no longer consistently predict irregular heart rate situations, AliveCor was forced to remove
5 SmartRhythm from the App Store. Other companies offering heartrate analysis apps on the Apple
6 Watch either did the same or limited their apps to just heartrate *tracking*, which is a more limited
7 type of app that operates in a separate market than heartrate analysis (discussed further below). All
8 of this has been devastating to competition, as Apple today commands 100% share of heartrate
9 analysis apps on watchOS devices and, if viewed in the alternative as part of either the U.S. ECG-
10 capable smartwatch or U.S. ECG-capable wearable devices market, over 70% market share. With
11 a single update, Apple thus eliminated competition that consumers clearly wanted and needed,
12 depriving them of choice for heartrate analysis that is better than what Apple can provide. And all
13 for an incremental value gain for an already-two-trillion-dollar company.

14 9. But that was not the end of Apple’s anticompetitive conduct. In parallel to this
15 lawsuit, the parties are litigating patent infringement actions regarding AliveCor’s intellectual
16 property—lawsuits that have already demonstrated Apple did not come up with the revolutionary
17 technology and market that it now seeks to own through its anticompetitive conduct.³ In response
18 to these actions, Apple originally filed *inter partes* reviews (“IPRs”) seeking to invalidate certain
19 claims of the three patents AliveCor asserted against Apple. However, as with all things Apple, that
20 was not enough.

21 10. In addition to the three original IPRs, Apple has since decided to use its unlimited
22 resources and power to attack every aspect of AliveCor’s business in a transparent attempt to bleed
23

24 ³ On June 27, 2022, an Administrative Law Judge of the International Trade Commission
25 found that Apple infringed two of AliveCor’s patents relating to electronic devices with
26 electrocardiogram functionality. *See In the Matter of Certain Wearable Electronic Devices with*
27 *ECG Functionality and Components Thereof*, Inv. No. 337-TA-1266, Notice of Initial
28 *Determination on Violation of Section 337* (Jun. 27, 2022); *see also Initial Determination on*
Violatino of Section 337 and Recommended Determination on Remedy and Bond, Public Version
(July 26, 2022). The ITC trial occurred between March 28, 2022 and April 1, 2022. The parties
are still engaged in litigating that investigation to a Final Determination by the full Commission.

1 AliveCor dry and prevent it from continuing to litigate this action or even operate as a business.
2 More specifically, Apple has filed a series of five additional IPRs (and counting) against AliveCor
3 patents for technology that Apple does not use, and does not have any publicly-stated plans to use.
4 It is clear that Apple does not care about the success of these IPRs; it simply wishes to use them as
5 a way to prohibitively increase AliveCor's costs so it is forced to drop this antitrust lawsuit and its
6 patent infringement lawsuits, force it into bankruptcy (thus putting the final nail in competition's
7 coffin), and signal to any other would-be competitors that they risk entering this market or seeking
8 to hold Apple to task at their own peril.

9 11. Apple's anticompetitive conduct was and remains rotten to the core. AliveCor
10 therefore brings this antitrust action to right past wrongs and to permit future competition, so that
11 Apple can no longer exclude it and other heartrate analysis providers from the market. U.S.
12 consumers deserve the right to have the best possible heartrate analysis made available to them.
13 This lawsuit is the first step in that direction.

14 **II. THE PARTIES**

15 12. Plaintiff AliveCor, Inc. is a Delaware corporation having its principal place of
16 business at 444 Castro St, Suite 600, Mountain View, CA 94041. AliveCor is a leader in the design
17 and development of products that provide intelligent, highly-personalized heart data to help
18 diagnose heart conditions.

19 13. Defendant Apple is a California corporation with its principal place of business in
20 Cupertino, California. Apple is likely the largest public company in the world. Apple sells
21 hardware, including Apple Watches, as well as a number of related services.

22 **III. JURISDICTION AND VENUE**

23 14. This Court has subject matter jurisdiction over plaintiff's federal antitrust claims
24 under the Clayton Antitrust Act, 15 U.S.C. § 26, and 28 U.S.C. §§ 1331 and 1337. The Court has
25 supplemental jurisdiction over plaintiff's state law claims pursuant to 28 U.S.C. § 1367.

26 15. This Court has personal jurisdiction over Apple because Apple's headquarters are
27 located in Cupertino, California. Apple has engaged in sufficient minimum contacts with the United
28 States and has purposefully availed itself of the benefits and protections of both United States and

1 California law such that the exercise of jurisdiction over Apple would comport with due process.
 2 Apple has also entered into agreements with developers and consumers that require related disputes
 3 to be litigated in this District.

4 16. Venue is proper in this District pursuant to 28 U.S.C. § 1391(b) because Apple
 5 maintains its principal place of business in the State of California and in this District, and because a
 6 substantial part of the events or omissions giving rise to plaintiff's claims occurred in this District.
 7 In the alternative, personal jurisdiction and venue also may be deemed proper under Section 12 of
 8 the Clayton Antitrust Act, 15 U.S.C. § 22, because Apple may be found in or transacts business in
 9 this District.

10 **IV. INTRADISTRICT ASSIGNMENT**

11 17. Pursuant to Civil Local Rule 3-2(c), this antitrust case shall not be assigned to a
 12 particular Division of this District, but shall be assigned on a District-wide basis.

13 **V. FACTS**

14 18. Apple has injured both AliveCor and competition by way of its unlawful
 15 anticompetitive behavior in the U.S. market for watchOS heartrate analysis apps. It has done so via
 16 abusing its monopoly power in that market, as well as the power it holds in the U.S. market for
 17 ECG- capable smartwatches.⁴ Apple's behavior has excluded competitors, reduced output and
 18 reduced innovation, and raised prices to supracompetitive levels for consumers. It has also caused
 19 AliveCor substantial damages, including up to the present, due to Apple's continued anticompetitive
 20 conduct.

21 **A. ALIVECOR: AN INNOVATOR APPLE ORIGINALLY EMBRACED TO** 22 **SELL APPLE WATCHES, BUT THEN EXCLUDED ONCE IT DECIDED TO** 23 **COPY ALIVECOR'S KEY INNOVATIONS**

24
 25
 26 ⁴ As discussed below, if one broadens these market definitions in the alternative to heartrate
 27 analysis apps for wearable devices and ECG-capable smartwatches or wearable devices, Apple
 28 still has monopoly power in both, and has violated the Sherman Act with anticompetitive activity
 that harmed competition in the app market, however defined.

1 19. When the first Apple Watch launched, it was not an “intelligent guardian for your
2 health,” as Apple claims today—it was a fashion accessory.⁵ The original version of the Apple
3 Watch lacked basic features such as water resistance, GPS, and 4G LTE—much less the ability to
4 record an ECG.⁶ In a self-evident misunderstanding of the Apple Watch’s best uses, Apple
5 premiered the original Watch with a cover spread in *Vogue* and sold upscale versions of the device
6 that incorporated features like gold inlays and high-end fashion bands, for prices up to \$17,000.⁷
7 The original Apple Watch also was not made available to the average consumer who showed up at
8 an Apple Store—it required a fitting appointment.

9 20. Dr. Dave Albert, one of AliveCor’s founders, was among the first to recognize that
10 the Apple Watch could be so much more than just an expensive extension to a smartphone. Dr.
11 Albert was a physician, inventor, and entrepreneur that graduated with honors from Harvard College
12 and Duke University Medical School. In 2010, he was featured in a viral YouTube video depicting
13 how the iPhone could be used together with a phone case to record an ECG.⁸ Dr. Albert realized
14 that portable devices like the iPhone could enable tremendous innovation in personal health
15 monitoring and analysis, and that the Apple Watch presented an even better use case for that sort of
16 medical tool. In 2011, Dr. Albert helped translate that insight into AliveCor.

17 21. AliveCor showed the potential the Apple Watch had as a medical device in 2015, the
18 same year Apple released the first Apple Watch. In a video much like the one he created in 2010,
19 Dr. Albert demonstrated an initial prototype of a new product, KardiaBand, which would allow users
20 to turn their fashionable Apple Watch into a medical device with the ability to record an ECG.⁹⁸

21
22 _____
23 ⁵ <https://www.washingtonpost.com/news/innovations/wp/2015/03/05/apple-watch-is-competing-as-a-fashion-accessory-and-thats-a-risky-move/>

24 ⁶ <https://swappa.com/blog/apple-watch-series-0-worth-buying/>

25 ⁷ <https://www.cnet.com/news/remember-when-apple-watch-was-luxury-item-we-look-back-5-year-evolution/>
26

27 ⁸ <https://www.mobihealthnews.com/12224/iphone-ecg-developer-alivecor-raises-3-million>

28 ⁹ <https://www.medgadget.com/2015/10/alivecor-previews-apple-watch-ecg-video.html>

1 22. AliveCor’s innovations, however, were not just limited to hardware. When AliveCor
2 eventually released its commercial KardiaBand product, AliveCor also released SmartRhythm, a
3 first of its kind app that remains best in class to this day. As discussed below, SmartRhythm used
4 data from the Apple Watch’s heartrate algorithm to detect when a user’s heartrate was likely
5 irregular and required follow up (*e.g.*, an ECG reading) to determine if it was a medically-worrisome
6 event.¹⁰⁹

7 23. Today, it is clear that Dr. Albert’s insights into linking portable technologies (like
8 the Apple Watch) to personal health monitoring and analysis were forward-thinking. In the six
9 years since Apple introduced the Apple Watch, fitness and health features have taken much more
10 of “center stage” for smartwatch devices,¹¹ and devices with high-end medical features now
11 constitute their own product sub-category (discussed further below). Indeed, at the same time
12 AliveCor made the ability to record an ECG and to provide true heartrate analysis on the Apple
13 Watch, Apple was discontinuing its line of \$10,000+ Apple Watches, because it had finally realized
14 that the device’s greatest potential was not as a fashion accessory.¹²

15 24. AliveCor’s innovations did not go unnoticed. After Dr. Albert first presented his
16 idea for the KardiaBand just a month after the Apple Watch release, he received a message from Dr.
17 Michael O’Reilly, Apple’s VP of Medical Technology, asking him to come to Apple’s campus and
18 present his ideas. At that meeting, Dr. Albert demonstrated the KardiaBand prototype to Apple
19 engineers and to Apple’s COO, Jeff Williams. Mr. Williams told Dr. Albert—at least at that time—
20 that Apple wanted to figure out how to work with AliveCor. A few months later, Dr. Albert and
21 AliveCor’s then-CEO met with Phil Schiller, Apple’s SVP of Worldwide Marketing, to demonstrate
22
23

24 ¹⁰ [https://www.alivecor.com/press/press_release/fda-clears-first-medical-device-for-apple-](https://www.alivecor.com/press/press_release/fda-clears-first-medical-device-for-apple-watch/)
25 [watch/](https://www.alivecor.com/press/press_release/fda-clears-first-medical-device-for-apple-watch/)

26 ¹¹ [https://www.cnet.com/news/remember-when-apple-watch-was-luxury-item-we-look-back-](https://www.cnet.com/news/remember-when-apple-watch-was-luxury-item-we-look-back-5-year-evolution/)
27 [5-year-evolution/](https://www.cnet.com/news/remember-when-apple-watch-was-luxury-item-we-look-back-5-year-evolution/)

28 ¹² [https://www.theverge.com/circuitbreaker/2018/9/12/17851918/apple-watch-edition-](https://www.theverge.com/circuitbreaker/2018/9/12/17851918/apple-watch-edition-discontinued)
discontinued

1 the KardiaBand prototype and to hopefully establish a relationship that would allow AliveCor to
2 work together with Apple.

3 25. During this period, visitors to Apple's campus noted that a large number of Apple
4 engineers in its Health division had KardiaBands on their Apple Watches. At the time, this was not
5 all that surprising (and was, in fact, exciting to AliveCor) because, from the moment AliveCor came
6 on the scene, Apple was fully aware of it and its innovations. Apple even advertised those
7 innovations to help sell the Apple Watch; specifically, by playing up AliveCor's heartrate analysis
8 capabilities and explaining how useful they would be for purchasers. Those advertisements clearly
9 worked, as Apple Watch sales continued to climb year over year over year and its potential as a
10 health device came into ever greater focus.

11 26. Following these advertisements and the Apple Watch's exponential growth, and after
12 over 18 months of conversations between Apple and AliveCor executives regarding AliveCor's
13 products, AliveCor received clearance from the FDA for the KardiaBand and gave Apple a heads-
14 up on KardiaBand's official launch date. A few hours later, Apple suddenly released a statement to
15 the press pre-announcing a heart initiative for the Apple Watch—a clear attempt to steal AliveCor's
16 thunder, given that AliveCor was just about to be the first company to actually provide the ability
17 to record an ECG on the Apple Watch and, just as importantly, real heartrate analysis that users
18 could utilize to figure out if they were in a potentially dangerous medical situation. Indeed, the pre-
19 announcement was all the more striking given Apple's general policy *against* pre-announcing
20 initiatives.

21 27. Over the next several weeks, Apple took additional steps to publicly undercut
22 AliveCor, now that it was clear that Apple viewed AliveCor as a competitor rather than as an
23 innovator helping drive Apple Watch sales. For example, AliveCor gave exclusive interviews to
24 Christina Farr, a technology and health reporter for CNBC in San Francisco. In 2017, Ms. Farr
25 ranked AliveCor as one of the top 10 most innovative companies in health, for “mobilizing health
26
27
28

1 monitoring.”¹³ After AliveCor told Apple about KardiaBand’s release, Apple decided it too would
 2 suddenly grant Ms. Farr an exclusive, presumably to squash any article or report Ms. Farr was
 3 developing about AliveCor. It worked, as she released an article that month mentioning AliveCor,
 4 but centering on Apple’s health initiative.¹⁴

5 28. One of the ironies of Apple’s “pre-announcement” and subsequent efforts to draw
 6 attention to its heart initiative rather than AliveCor, however, is that it actually validated AliveCor’s
 7 business concept and initially led to an uptick in AliveCor’s sales. Given Apple’s much larger
 8 megaphone on public relations issues, Apple Watch users were better able to learn about the ability
 9 to utilize their Watch as a heart health device and began looking for companies offering that
 10 functionality. AliveCor therefore benefited from Apple confirming that Apple itself saw a future in
 11 this realm. Competition was healthy for AliveCor, and welcomed. But Apple had other designs.

12 29. In September 2018, Apple announced an updated Apple Watch along with an
 13 updated version of the operating system running the device (watchOS) that not only added the ability
 14 to record an ECG (like what KardiaBand already provided), but also for the first time included an
 15 Apple- developed heartrate analysis app. According to Apple CEO Tim Cook, Apple did not
 16 initially intend to offer such features, but was scrambling in 2018 to add such functionality because
 17 it saw that users demanded those features.¹⁵¹⁴ Of course, the only reason Apple learned this fact is
 18 that it saw firsthand the popularity of AliveCor’s products. But Apple apparently decided that it
 19 wanted to completely own the market, so, in the months leading up to the September 2018
 20 announcement, Apple took numerous steps to try to hamper and limit AliveCor, but failed each time.

21 ¹³ https://www.fastcompany.com/3067883/the-10-most-innovative-companies-in-health-2017?itm_source=parsely-api

22 ¹⁴ <https://www.cnn.com/2017/09/20/apple-watch-as-diagnosis-tool-cardiologists-skeptical.html>

23 ¹⁵ <https://www.outsideonline.com/2420733/tim-cook-apple-fitness-wellness-future> (“As
 24 Cook and I make our way into the Apple Park courtyard, he explains how, in 2018, Apple found
 25 itself developing sensors and software for the Watch that could detect atrial fibrillation, or A-fib—
 26 an irregular heartbeat that can be deadly if not properly managed. This was not something the
 27 design team had planned to do. Like many of the Watch’s features, it came about after learning
 28 how the device was being used.)

1 Unable to accept this state of affairs because it stood to reap massive benefits by monopolizing
 2 heartrate analysis on Apple Watches—and, specifically, the health data that analysis provides—
 3 Apple chose to eliminate competition entirely by including a change in watchOS5 that made it
 4 effectively impossible for any third party to provide heartrate analysis on the Apple Watch. To
 5 understand why this mattered for consumers and developers, it bears first discussing the relevant
 6 markets in which Apple and AliveCor operate, and the scope of Apple’s considerable monopoly
 7 power in each.

8 **B. APPLE MONOPOLIZES HEARTRATE ANALYSIS APPS**

9 30. Although this case focuses on Apple’s exclusionary conduct regarding heartrate
 10 analysis apps, it involves the abuse of monopoly power in multiple markets. Those markets include
 11 the U.S. markets (or aftermarkets) for watchOS heartrate analysis apps (*e.g.*, AliveCor’s
 12 SmartRhythm and Apple’s version of that same app) and ECG-capable smartwatches (*e.g.*, Apple
 13 Watch Series 4 and later, Samsung Galaxy Watch 3, etc.), as well as the power Apple possesses
 14 over locked-in Apple Watch users. But, even if the markets are viewed in the alternative as more
 15 broadly defined—*i.e.*, as relevant markets for wearable device heartrate analysis apps, ECG-capable
 16 wearable devices generally, and/or smartwatches generally—Apple still possesses (and has abused)
 17 monopoly power in each. Each market is discussed in further detail below.

18 **1. Apple Has Monopoly Power in the Relevant Markets for ECG-Capable Smartwatches and watchOS Heartrate Analysis Apps**

19 (i) ECG-capable smartwatches

20 31. ECG-capable smartwatches constitute their own relevant market, but in order to
 21 understand why, one must first understand the separate nature of the broader product category to
 22 which they belong: smartwatches.¹⁶

23 32. A smartwatch is a mobile computing device with a touchscreen display that is
 24 typically worn on the wrist. As the name implies, the device acts as a digital watch, but also provides
 25

26 ¹⁶ AliveCor recognizes that, in the Court’s order granting in part, and denying, in part,
 27 Apple’s motion to dismiss, the Court found that AliveCor did not plausibly allege the hardware
 28 markets discussed herein. AliveCor has retained these allegations in this First Amended
 Complaint to preserve them for appeal.

1 substantial additional functionality that effectively renders it an extension of a user's smartphone
2 (although it is not a replacement for a smartphone, given that smartwatches are more limited in terms
3 of functionality than a smartphone, and because their much-smaller size makes them impracticable
4 as a replacement for such devices).¹⁷ Smartwatches' broad functionality (including the ability to
5 use multiple types of apps and easily select between them), as well as their touchscreen capabilities
6 are the main driver of demand for the devices, because those features provide users with
7 smartphone-like capabilities in a wearable device that is also able to, *inter alia*, monitor health
8 characteristics.

9 33. Other types of wearable devices are not reasonably interchangeable with
10 smartwatches because they neither constrain pricing nor demand for such devices. Traditional
11 wristwatches, for example, do not provide any "smart" characteristics, such as app-based
12 functionality, the ability to act as both an extension of and sensor for smartwatches, a touchscreen,
13 or health monitoring capabilities. Users looking for a device to perform the sorts of tasks a
14 smartwatch can perform thus would not seek out a traditional wristwatch instead. Similarly, fitness
15 trackers, such as those sold by Fitbit and Garmin (among others), are not reasonably interchangeable
16 with smartwatches because, although fitness trackers offer some health monitoring and, in limited
17 cases, touchscreen functionality, they do not offer the broad array of other functions a smartwatch
18 provides. Put differently, although smartwatches and fitness trackers both provide some level of
19 health monitoring, smartwatch users want a device that provides *more* than just health monitoring
20 and therefore would not switch to fitness trackers instead if a hypothetical monopolist of
21 smartwatches raised prices on all smartwatches by a small but significant, non-transitory amount.

22 34. There are numerous other practical indicia indicating that smartwatches are a
23 separate relevant market. The industry plainly recognizes smartwatches' unique and separate
24 nature. *Apple*, for example, recently noted in a filing with the International Trade Commission that
25 "replacement products" for the Apple Watch included only other smartwatches (and made no
26

27 ¹⁷ In economic terms, smartwatches are a complement to smartphones, in that their value to
28 the user increases when used in conjunction with a smartphone.

1 mention of fitness trackers). Similarly, industry analysts regularly distinguish between
2 smartwatches, fitness trackers, and traditional watches. Indeed, even manufacturers that sell both
3 fitness trackers and smartwatches distinguish between the two types of products, specifically
4 naming or categorizing devices as either “trackers” or “smartwatches.”¹⁸ This is unsurprising, given
5 that, as noted above, smartwatches have peculiar characteristics and uses, in that they effectively act
6 as extensions and expansions of a smartphone. Fitness trackers provide some of that functionality,
7 but not nearly all, and demand for smartwatches is therefore independent of fitness trackers as a
8 result. Smartwatch prices similarly are not sensitive to prices from other types of wearable device;
9 for example, fitness trackers are typically sold for far less than smartwatches and those lower prices
10 do not affect demand for smartwatches.

11 35. As most relevant to this case, within the broader smartwatch market there is a sub-
12 category for smartwatches capable of taking ECGs. As noted previously, an ECG is a recording of
13 the electrical signals in one’s heart. It is a common test used to quickly detect heart problems and
14 monitor heart health. In order to advertise the ability to take an ECG, a manufacturer must first
15 obtain clearance from the FDA.

16 36. For smartwatch users, the ability to record an ECG adds a level of heart health-related
17 functionality that, when combined with a smartwatch’s other functionality, provides a unique
18 combination of uses not available on any other type of wearable or mobile computing device.
19 Specifically, a user concerned with the ability to meaningfully diagnose any heartrate issues in real
20 time can only choose a device that is capable of taking ECG readings; otherwise, beyond the most
21 obvious situations, they will be unable to medically determine whether they are experiencing a heart-
22 related event requiring medical assistance. With the exception of a few ECG-specific wearable
23 devices, AliveCor is unaware of any other wearables that provide ECG functionality *besides*
24 smartwatches (*e.g.*, no fitness trackers allow users to take ECGs). ECG-capable smartwatches thus
25 constitute their own relevant market, because users looking for a device to serve that purpose would
26 not switch in meaningful enough numbers to other types of device to make a small but significant

27
28 ¹⁸ See, *e.g.*, <https://www.fitbit.com/global/us/products>

1 increase in price for all ECG-capable smartwatches unprofitable. Indeed, in a recent filing with the
 2 International Trade Commission, Apple conceded that “the Apple Watch Series 4-6 occupy a unique
 3 space in the competitive landscape” (from other smartwatches) because they are capable of taking
 4 an ECG reading and performing heartrate analysis. Adding to this is that the same sorts of practical
 5 indicia discussed in Paragraph 32 above with respect to smartwatches generally demonstrate that
 6 ECG-capable smartwatches are a relevant market of their own. There is industry recognition that
 7 such smartwatches are a unique product group;¹⁹ they provide peculiar characteristics and uses (*i.e.*,
 8 smartwatch capabilities with added ECG functionality);²⁰¹⁸ are not sensitive to prices from other
 9 types of wearable device, including smartwatches that are unable to take ECG readings (*i.e.*, ECG-
 10 capable smartwatches typically have higher prices, due to their added functionality); and have
 11 distinct users (*i.e.*, smartwatch customers who also want or need the ability to record an ECG).

12 37. As discussed below, however, even if one defined the relevant market more broadly,
 13 such as all smartwatches or all ECG-capable wearable devices, Apple still has dominant market
 14 share and monopoly power. Thus, if one applied such alternative market definitions (which
 15 AliveCor adopts in the alternative for its claims), then Apple’s conduct still violates the antitrust
 16 laws for the reasons discussed herein.

17 38. Heartrate analysis apps (described more fully below) are currently only available for
 18 ECG-capable smartwatches and ECG-capable wearable devices. This is because, although heartrate
 19 analysis apps can provide strong predictions that a user is experiencing some sort of problematic
 20 heart health event, the gold standard to confirm that fact is by recording an ECG. There is thus little
 21 demand for heartrate analysis apps if the user is not also able to record an ECG to confirm or
 22

23 ¹⁹ See <https://www.wareable.com/health-and-wellbeing/ecg-heart-rate-monitor-watch-guide-6508>.

24 ²⁰ For example, during this year’s NFL conference final games, Apple aired a commercial
 25 devoted entirely to the Apple Watch’s ability to take an ECG reading anytime, anywhere.
 26 Presumably, that ad was focused on football viewers whose heart health may be in question,
 27 making the Watch’s ECG functionality of paramount concern to them. Given the expense of ad
 28 time on such well-watched, important games, it is clear that Apple believes that advertising ECG
 functionality above all else on the Apple Watch will distinguish the Watch from other types of
 smartwatches and lead to increased sales.

1 diagnose any irregular heartrate condition. Heartrate analysis apps are thus a complement to ECG-
2 capable smartwatches and ECG-capable wearable devices.

3 39. The relevant geographic market for ECG-capable smartwatches or, in the alternative,
4 ECG-capable wearable devices is the United States. The companies providing such apps are located
5 in the U.S. and the devices must be cleared by the U.S. FDA.

6 (ii) watchOS heartrate analysis apps

7 40. An application is a program or group of programs designed for end-users of a
8 computing device. Different types of apps allow a computing device to perform different types of
9 functions; *e.g.*, taking pictures, word processing, playing a game, booking dinner reservations, etc.
10 Users looking for a certain type of functionality thus only have a finite set of reasonably
11 interchangeable alternatives from which to choose—a user, for example, looking for a video
12 conferencing app would not choose a news app, and vice versa.

13 41. As discussed in further detail below, a computing device user is further constrained
14 in app selection by their device’s operating system (“OS”). Apps are written to work on a specific
15 OS and can only work on that OS. Thus, iOS device users can only use iOS apps, Android users
16 can only use Android apps, and so on. As most relevant here, this means that Apple Watch users
17 can only use apps written for watchOS. An Apple Watch user looking for certain functionality on
18 their device may therefore only choose between apps that both offer that specific functionality *and*
19 are written for watchOS.

20 42. A heartrate analysis app, as the name implies, analyzes the user’s heartrate in real
21 time, typically using a PPG sensor in close proximity to the user’s wrist. The app determines
22 whether the user’s heartrate is normal (and thus likely healthy) or irregular (and thus likely
23 indicating that the user should seek medical aid). Such an app is different than one, like the Kardia
24 app, that records and interprets an ECG—a recording that must be collected using specialized
25 hardware and multiple physical contacts with electrodes on the device (*e.g.*, the user placing the
26 finger of their other hand on the device to close an electrical circuit, rather than relying on a single
27 PPG sensor in proximity with the wrist on which the device is worn), and it provides medically-
28 accurate data to a doctor for further analysis. Although an app (*e.g.*, Kardia) can interpret irregular

1 rhythms, like AFib, from an ECG, those interpretations are only available if the user specifically
 2 decides to record an ECG. In contrast, a heartrate analysis app is one designed to run constantly
 3 while the device is worn and alert a user when they are likely in a situation requiring an ECG
 4 recording and medical analysis. Apple itself delineates between the two types of app, noting their
 5 different purposes.²¹

6 43. A heartrate analysis app is also different than a heartrate *tracking* app, which is
 7 designed simply to keep track of certain aspects of a user's heartrate (usually, beats per minute) in
 8 order to assess general fitness and/or progress toward certain fitness goals. Indeed, Apple itself
 9 delineates between the two types of app, noting in a recent filing, for example, that its ECG app and
 10 Irregular Rhythm Notification "feature" (*i.e.*, Apple's name for the heartrate analysis app it preloads
 11 on Apple Watches)—which it states focus on "heart rhythm health"—are different than and distinct
 12 from "monitoring for unusually high or low heart rates (unrelated to AFib detection)." Today, the
 13 vast bulk of heart-related apps on smartwatches are *tracking* apps.

14 44. Given its medical nature, a heartrate analysis app must be reliable enough that it
 15 provides medically-useful information to the user. Such information goes beyond tracking and
 16 noting basic observations about the user's heartrate; as the name of the product type implies, the app
 17 must not only monitor, but also provide qualitative *analysis* about the user's heartrate to alert them
 18 regarding potentially problematic medical situations. Moreover, if a heartrate analysis app provides
 19 the user with a diagnosis (*i.e.*, informs the user they have a particular illness or other problem after
 20 analyzing the user's symptoms), it must be cleared by the FDA. All of this is in contrast to heartrate
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23 ²¹ See <https://www.apple.com/healthcare/apple-watch/> (discussing the "irregular rhythm
 24 notifications" app on the Apple Watch—*i.e.*, the heartrate analysis app—and, separately, the
 25 "ECG app," and noting for the latter that it is for users that, *inter alia*, "receive the irregular
 26 rhythm notification" and therefore can "capture an ECG and record their symptoms" and use
 27 "[t]his real world data [to] enable you to make more informed and timely decisions regarding
 28 further evaluation and care"); see also <https://support.apple.com/en-us/HT208955> (separately
 instructing users how to utilize the "ECG app" on the Apple Watch, which requires specific
 action, and noting that "By looking at an ECG, a doctor can gain insights about your heart rhythm
 and look for irregularities.").

1 tracking apps, which do not similarly require medically-analytical information and do not require
2 FDA clearance.

3 45. Given heartrate analysis apps' unique nature, no other type of app is reasonably
4 interchangeable with them. As noted, an ECG app does not provide monitoring and analysis, and
5 does not alert a user to the times when they should likely record an ECG. An ECG app therefore
6 has a different purpose and use than a heartrate analysis app. As also noted, heartrate tracking apps
7 have a different purpose and, although, a heartrate analysis app might keep track of a user's heartrate
8 in somewhat similar ways as a tracking app (*e.g.*, by keeping track of beats per minute and keeping
9 track of heartrate during different types of activity), the purpose for doing so is different, in that an
10 analysis app keeps track of such data for analytical and/or diagnostic purposes whereas a tracking
11 app does so for other purposes—generally monitoring fitness goals and simply keeping a record of
12 heart activity during different points of a user's day without any other sort of substantive analysis.

13 46. There are also practical indicia indicating that heartrate analysis apps are a separate
14 relevant market. Industry participants, for example, recognize that apps capable of analyzing heart
15 rate irregularities in real time are distinct from other types of app.²² Such apps similarly have
16 peculiar characteristics that others types of app and device do not (*i.e.*, analyzing and interpreting
17 heartrate data on a wearable device to determine irregular heartrate situations). Customers seeking
18 out these apps are those who need or wish to have access to ready analysis of their heart health, so
19 they can seek medical attention as necessary. This is in contrast to users who simply wish to track
20 their heartrate for fitness or other purposes (rather than obtain substantive feedback on their heartrate
21 and/or a diagnosis based on their heartrate). Heartrate analysis app prices also are not sensitive to
22 price changes for other types of apps, given the unique functionality they provide. And vendors of
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24

25 ²² See, *e.g.*, *id.* (noting the difference between Apple Watch's irregular rhythm notifications
26 and its ECG app); <https://www.cnet.com/health/apple-watch-ecg-app-what-cardiologists-want-you-to-know/> (same); see also <https://www.mobihealthnews.com/news/fitbit-releases-new-smartwatch-ecg-app-stress-management-features-skin-temperature-sensor-and> (noting distinction
27 between Fitbit Sense's "ECG app" and "heart rate tracker," the latter of which is the function that
28 alerts the user when their heartrate appears abnormal; *i.e.*, is a heartrate analysis app).

1 heartrate analysis apps that provide diagnoses must obtain FDA clearance for the apps, which is a
 2 unique legal requirement.

3 47. For Apple Watch users, the only heartrate analysis apps are those written for
 4 watchOS. Thus, the only reasonably interchangeable heartrate analysis app alternatives an Apple
 5 Watch user can select are watchOS apps. This means watchOS heartrate analysis apps constitute a
 6 relevant product market.

7 48. As discussed below, however, even if one defined the relevant market more broadly,
 8 such as all heartrate analysis apps for wearable devices, Apple still has dominant market share
 9 and monopoly power. Thus, if one applied such an alternative market definition (which AliveCor
 10 adopts in the alternative for its claims), then Apple's conduct still violates the antitrust laws for the
 11 reasons discussed herein.

12 49. The relevant geographic market for watchOS heartrate analysis apps or, in the
 13 alternative, heartrate analysis apps for wearable devices is the United States. The companies
 14 providing such apps are located in the U.S. and any apps that provide diagnoses must be cleared by
 15 the U.S. FDA.

16 (iii) Monopoly power

17 50. Apple possesses monopoly power in the U.S. market for ECG-capable smartwatches
 18 (or, in the alternative, ECG-capable wearable devices), and in the U.S. market (or aftermarket) for
 19 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).
 20 Customers in each market are consumers purchasing ECG-capable devices. Apple's monopoly
 21 power in each market is discussed in further detail below.

22 A) ECG-capable smartwatches

23 51. Although some smartwatches existed before the Apple Watch, that device came to
 24 define the product category shortly after its introduction. In the U.S., Apple quickly obtained
 25 massive market share for smartwatches and has since continued to dominate that market despite
 26 other manufacturers' efforts. Today, Apple commands over 55% of the worldwide smartwatch
 27
 28

1 market²³— with Asian brands such as Huawei and Samsung much more popular overseas—and, on
 2 information and belief, over 68% of the U.S. smartwatch market.²⁴

3 52. As noted above, the sub-category of ECG-capable smartwatches is an even smaller
 4 niche in the U.S. As industry analysts have observed, “[a]s all major vendors set their sights on
 5 2021, medical-oriented devices will move certain products into an elevated tier, creating stronger
 6 differentiation between casual fitness and advanced health tracking.”²⁵ Apple’s closest competitors
 7 only offer ECG functionality on a subset of their smartwatches (and not on their fitness trackers),
 8 so Apple’s market share is even higher for ECG-capable smartwatches—on information and belief,
 9 well over 70%. If one broadens the market to include all ECG-capable wearables, that market share
 10 does not appreciably change (*i.e.*, does not dip below 70%), because non-smartwatch ECG-capable
 11 wearables constitute only a very small portion of sales in such an alternatively-defined market.

12 53. In addition to this high market share, there also exist extremely high barriers to new
 13 entry. A new entrant hoping to sell ECG-capable wearable devices of any type must expend
 14 extremely high startup costs in the form of cash outlay, but also substantial research & development,
 15 as well as specialized technical and medical knowhow. Once they have designed a product, a new
 16 entrant must then obtain FDA clearance for the device and any algorithms it uses to diagnose
 17 heartrate issues—as Apple itself conceded in a recent filing with the International Trade
 18

19 ²³ <https://9to5mac.com/2020/05/07/smartwatch-sales-grow/>

20 ²⁴ In Q2 2020, for example, Apple shipped approximately 37.6% of all wearable devices in
 21 North America, a category that includes both smartwatches and fitness trackers.
 22 <https://canalys.com/newsroom/canalys-north-american-wearables-market-Q2-2020>. Its closest
 23 competitors were Fitbit, Garmin, and Samsung, all of which sell a mix of smartwatches and fitness
 24 trackers, unlike Apple, which only sells smartwatches. (The “Others” category in this report
 25 mainly consists of sub-\$50 wearables, which are almost exclusively fitness trackers. *See*
 26 <https://www.sammobile.com/news/samsung-smartwatch-market-share-drops-north-america-q2-2020/>.) Analysts estimate that fitness trackers dominated sales for Apple’s competitors in the
 27 reporting time period, indicating that more than 50% of their shipments were not smartwatches.
 28 *See* <https://www.imore.com/north-american-wearables-market-still-belongs-apple>. Adjusting these
 competitors’ reported shipments to 50% smartwatches and 50% fitness trackers, as well as
 excluding the other low-end fitness trackers, therefore indicates that Apple made over 68% of
 North America smartwatch sales in 2020.

²⁵ <https://canalys.com/newsroom/canalys-north-american-wearables-market-Q2-2020>

Commission. Another barrier to new entry is the need for substantial and specialized manufacturing capabilities, much of which is controlled by the current major participants in the market. As discussed below, given the amount of time smartwatches have now been in the market, there are high switching costs to a new entrants' devices, making it even more difficult to gain any sort of substantial share away from existing participants.

B) watchOS heartrate analysis apps

54. Given its complete control over both watchOS and distribution for watchOS apps, as well as due to its efforts (described herein) to exclude all competition for heartrate analysis apps on watchOS devices, Apple has unrivaled monopoly power in this market and has erected insurmountable barriers to entry for new (or even existing) market participants. To this point, Apple has the absolute power to exclude competitors from the market, because it has positioned itself as gatekeeper for watchOS devices due to its control over watchOS distribution (*i.e.*, all watchOS apps must be distributed through Apple's App Store). Apple also has the ability to sabotage its rivals—as it did here—by changing how watchOS works. Due to its anticompetitive conduct, Apple has obtained and maintained nearly 100% market share in watchOS heartrate analysis apps, and its monopoly power is protected by high barriers to new entry, including the watchOS distribution and competitor sabotage capabilities described above, as well as the scale necessary to achieve cost efficiencies and Apple's other exclusionary and anticompetitive conduct described herein. Furthermore, just as with ECG-capable wearable devices overall, heartrate analysis apps providing diagnoses must be cleared by the FDA, so that is an additional legal barrier to new entry.²⁶

55. For the reasons described above, if the market is defined more broadly as heartrate analysis apps for all wearable devices, Apple still has over 70% of such a market (due to its dominance of wearable devices capable of providing heartrate analysis), and the barriers to new entry remain the same, because Apple still acts a gatekeeper to the vast majority of that market and entrants must still overcome the other entry barriers described above.

²⁶ As noted above, not all heartrate analysis apps provide diagnoses. However, to the extent they wish to provide such a feature, they must overcome this legal barrier.

1 56. App developers cannot constrain Apple's anticompetitive conduct in the watchOS
 2 heartrate analysis market or alternative heartrate analysis app for wearable devices market by
 3 declining to develop heartrate analysis apps for watchOS. If a developer does not develop apps for
 4 watchOS, the developer must forgo *all* of the more than one hundred million watchOS users. No
 5 developer has sufficiently important or attractive apps to overcome the network effects and
 6 switching costs associated with watchOS to entice enough watchOS users to leave watchOS, such
 7 that developing heartrate analysis apps solely for other platforms would affect Apple's
 8 anticompetitive conduct.

9 57. Similarly, competition in the sale of ECG-capable wearables (whether smartwatches
 10 or all such devices) does not constrain Apple's power in the watchOS heartrate analysis app market
 11 (or aftermarkets) because, as discussed below, watchOS device users face substantial switching
 12 costs and lock-in to the Apple ecosystem. Further, regardless of competition in the sale of wearable
 13 devices, competition at that level would not constrain Apple's power in the watchOS heartrate
 14 analysis app market (or even a broader heartrate analysis app for wearable devices market) because
 15 consumers cannot adequately account for and therefore constrain Apple's anticompetitive conduct
 16 through their purchasing behavior.

17 58. Apple is also an attempted monopolist in the U.S. market for watchOS heartrate
 18 analysis apps (or, alternatively, heartrate analysis apps for wearable devices). Given that the facts
 19 alleged herein amply support a finding that Apple has wrongfully obtained and maintained
 20 monopoly power in this market, they support a finding that Apple is attempting to monopolize the
 21 market by improper, intentional means.

22 **2. Apple Has Monopoly Power Over Locked-In Apple Watch Users**

23 59. In designing iOS and the iPhone, which respectively acted as conceptual precursors
 24 to watchOS and the Apple Watch, Apple was faced with a problem that previously plagued its
 25 desktop and laptop computers throughout the 1980s and 1990s. In that era, Apple took an almost
 26 entirely proprietary approach to its hardware and software. That approach, however, severely
 27 limited the scope of Apple's software offerings and put it at a decided competitive disadvantage
 28 against others, such as Microsoft and OEMs that used the Windows operating system, who took a

1 much more open approach to software. Apple thus carved out only a very small, niche market share
2 during that era, and in fact almost went bankrupt as a result. Indeed, it was not until Apple relented
3 and stopped trying to prevent third party developers from operating in its software application
4 markets that its fortunes turned around.

5 60. Guided by this historical lesson and by early innovators' success and popularity with
6 third party iOS apps, Apple realized soon after introducing the iPhone that it needed to offer at least
7 the appearance of broad choice of software to use on its new smartphone. This was particularly so
8 because other companies—notably, Google, Microsoft, and Blackberry—were developing their
9 own smartphones and had a much more open history regarding third parties' ability to create and
10 sell applications for their respective platforms. Apple therefore introduced the App Store in July
11 2008 and thereafter actively tried to encourage the appearance of a robust market for iOS apps.
12 Touting the choice and breadth of apps the App Store presumably enabled, Apple has consistently
13 used the availability of third party applications to fuel the demand for the iPhone and its iOS
14 operating system. Indeed, Apple promoted the iPhone by heavily advertising third party
15 applications and stating, “there’s an app for that.” Those efforts succeeded in driving demand for
16 its iOS devices, including the iPhone, in competition with devices running other operating systems.

17 61. When it released the Apple Watch, Apple sought to repeat the iPhone’s success by
18 similarly touting the availability of third party apps for the device. As noted above, Apple advertised
19 the highly-innovative offerings from third parties, such as AliveCor, in an effort to establish in users’
20 minds that this new wearable smart device was revolutionary, but also highly useful and worth their
21 additional money. Users could search for Watch apps on their iPhones via the App Store app and
22 then download the apps to their Watch directly. Later, in 2019 with the watchOS 6 update, Apple
23 introduced an App Store app directly onto Apple Watches themselves.²⁷

24 62. Just as with the iPhone, Apple’s advertising efforts regarding third party apps helped
25 drive demand for Apple Watches in competition with smartwatch devices running other operating
26 systems. Every Apple Watch that Apple sells runs watchOS and comes with a number of
27

28 ²⁷ <https://www.pcmag.com/how-to/how-to-use-the-new-app-store-on-your-apple-watch>.

1 preinstalled apps, despite the ability to install third party apps that Apple approves for distribution
2 through the App Store.

3 63. High switching costs prevent users from switching from one operating system to
4 another operating system after they initially purchase a mobile device. These switching costs
5 increase over time for a variety of reasons, including, among other things, the cost of the mobile
6 device (for smartwatches, hundreds, if not over a thousand, dollars); the user's familiarity with the
7 operating system and unwillingness to learn a different operating system; the user's familiarity with
8 apps on that operating system; the users' costs sunk into purchased applications that are not
9 compatible with other operating systems, which is amplified by the restrictions on the App Store
10 and the inability of App Store developers to communicate freely with their users; and the costs of
11 hardware purchased to support the mobile devices utilizing that operating system (*e.g.*, power cords,
12 wireless mouse/keyboards, wireless headphones, other device-specific peripherals), which would
13 have to be incurred anew if the user switched to a different type of device. Moreover, switching
14 costs for mobile devices—particularly for watchOS devices, due to Apple's typically extreme
15 practices—have increased dramatically in recent years with the advent of cloud computing, which,
16 *inter alia*, allows users to store their files on the "cloud" (*i.e.*, not directly on their device). As
17 specifically relevant to Apple, iOS and watchOS users' photos, videos, music files, and other
18 personal files (such as health data collected by the Apple Watch) are often stored on iCloud and
19 only accessible on other Apple devices. Although users may obtain copies of some of those files,
20 Apple has made doing so neither easy nor intuitive, and thus made it very difficult for users to
21 effectuate this kind of transition. This means that Apple device users become more and more locked
22 into Apple devices, because they wish to have continued access to their personal files—and this is
23 a switching cost they have little ability to understand or appreciate before purchasing an Apple
24 device.

25 64. Apple Watch users face an additional switching cost in that Apple Watches, by
26 design, can only be used with an iPhone. The Apple Watch's capabilities therefore cannot be used
27 to their fullest extent unless paired with an iPhone, which further locks users into the Apple
28 ecosystem by entrenching the user with both an Apple smartphone *and* smartwatch, and makes

1 switching to another mobile ecosystem—or mixing and matching devices from different
2 manufacturers—difficult-to- impossible.

3 65. Yet another switching cost is Apple’s ability to completely control and push over-
4 the- air (*i.e.*, through the internet) updates for watchOS on both preexisting and new Apple Watches.
5 Users purchasing an Apple Watch cannot control what Apple does with those OS updates and Apple
6 is thus able to change functionality on the Watch at its whim. Practically speaking, this means that
7 apps a user selects before an update can suddenly not work after Apple updates watchOS, and users
8 cannot go back to an earlier version of the OS after updating. This all gives Apple control over the
9 options and functionality available to Apple Watch users long after they buy their Watch.

10 66. These high switching costs, which were (and are) not readily apparent to the vast
11 majority of Apple Watch users before they purchase their devices, were nevertheless apparent to
12 Apple early on. This led it to realize that it could make enormous additional profits if it exerted
13 complete control over the various aftermarkets into which Apple Watch users were locked once they
14 purchased their device. One of the ways it did so that is relevant to this case was by ensuring that
15 it controlled every aspect of watchOS app distribution, including by requiring that app developers,
16 like AliveCor, use the App Store app as the sole marketplace and distributor for watchOS apps
17 instead of more traditional channels, such as developers’ websites, general websites, competing
18 electronic marketplaces, and even brick and mortar stores. Apple exerted this control because, once
19 it forced its way into that gatekeeper role, Apple was able to completely control the aftermarket for
20 watchOS apps (via its power over watchOS app developers who wanted to sell to Apple Watch
21 users) and accordingly increase its profits at an exponential rate. As discussed herein, Apple’s initial
22 efforts to exclude competition for heartrate analysis apps initially stemmed from its control over
23 watchOS app distribution. It was only after those efforts failed to dissuade AliveCor from
24 competing that Apple then turned to more drastic measures involving watchOS itself.

25 67. All of this is highly problematic because, as also noted above, apps must be designed
26 to run on a specific operating system. A device running watchOS can only run apps designed for
27 watchOS. Thus, once a user selects watchOS as their operating system by purchasing an Apple
28 Watch, that user can only run applications designed for watchOS on their device. This means that,

1 for Apple Watch users, apps written for other operating systems besides watchOS are not
2 interchangeable at all with watchOS apps, because they cannot be used on an watchOS device, and
3 the user is thus beholden to Apple for the options available on the Apple Watch. Put differently,
4 watchOS apps exist in an aftermarket, much the same as Windows apps exist in their own
5 aftermarket and Android apps exist in their own aftermarket. The operating system on a user's
6 device, once they purchase that device, defines and limits the universe of apps from which they can
7 choose any alternatives (let alone reasonable alternatives).

8 68. App developers, such as AliveCor, face a similar reality. The existence of other
9 mobile device operating systems is meaningless to developers who program apps and in-app
10 products for use on the Apple Watch, because it does not change the markets into which those apps
11 are sold and developers cannot take a one-size-fits-all approach to app development. Developers
12 may learn to code in the Swift or Objective-C programming languages—*i.e.*, the two main
13 programming languages for watchOS apps—and they and their employees, if any, may not know
14 how to code in a different programming language applicable to devices running on a different
15 operating system. Regardless of what programming languages they know, however, developers
16 cannot simply run a program to convert watchOS applications to the code used for a different
17 operating system environment in the way that one might convert a Word document to a PDF;
18 instead, the apps must be written anew in the code for that device or system.

19 69. Based on these differences, a move away from the watchOS system would mean that
20 a developer could no longer offer its watchOS apps or in-app products to tens of millions of
21 consumers (who would have no other way to buy these products for their devices), and the developer
22 would have no substitute available, because it could not sell its watchOS app(s) into a different
23 market for wearable apps, such as for the Tizen or Android Wear operating systems. And, even if
24 one engaged in the time and expense to reprogram an watchOS app for those other operating
25 systems, distributing it through an app distribution service geared toward apps written for that other
26 operating system would have (and has) no effect on Apple's power or practices with respect to
27 watchOS apps.

70. In previously-filed legal actions regarding Apple's app-related anticompetitive conduct, Apple has argued that consumers sometimes have multiple devices running different operating systems, and that this somehow means there is not a market (or aftermarket) for apps written specifically for Apple devices. Such an argument, however, is factually incorrect. As an initial matter, different types of computing devices are not reasonable substitutes for one another, due to both switching costs and imperfect information. (A user will not buy a laptop, for example, if they want a smartwatch. They purchase the laptop because of its unique form factor and the computing purposes to which the user wants to put the device. The same goes for a smartwatch, as discussed above.) But, even if this were not the case, consumers typically purchase and use just one smartwatch device at a time. The same goes for other types of computing devices, such as smartphones, tablet computers, or laptops. The apps available to a consumer are therefore typically confined to the operating system on each device; *i.e.*, they can only run apps written for that device's operating system. Thus, if a consumer has an Apple Watch and a Windows laptop, they will need apps written for watchOS and Windows, respectively, even if those apps perform the same essential functions (*e.g.*, email, web browsing, etc.). Furthermore, it is clear that some types of computing devices simply *cannot* replicate functionality on other types of computing devices, such as monitoring health on a smartwatch.

71. For all these reasons, Apple Watch users are locked into their purchase and Apple has complete control—and, thus, monopoly power—over the aftermarkets for watchOS apps (among others) in which Apple Watch users can select and obtain apps for their device.

3. Apple's Anticompetitive Conduct and AliveCor's Antitrust Injury

72. Apple has harmed competition by excluding competitors for watchOS heartrate analysis apps (or, alternatively, heartrate analysis apps for wearable devices) through a variety of unreasonable, exclusionary, and predatory means. When it first introduced the Apple Watch, Apple did not exclude such competition. However, given the numerous benefits Apple realized it could reap both in that market and adjacent markets (based on, *inter alia*, the data Apple obtains through the heartrate analysis it now provides to Apple Watch users), it not only entered that market, but

1 then unfairly cornered it by excluding nearly all competition to the clear detriment of consumers
2 and competitors alike.

3 73. It was not always this way. As noted above, when AliveCor first began developing
4 its products for the Apple Watch, Apple embraced AliveCor as an innovator and explicitly used
5 AliveCor's innovations to sell the Apple Watch. AliveCor's Kardia app (which users utilize to
6 record an ECG via the KardiaBand) was accepted for distribution through the App Store easily. The
7 initial version of SmartRhythm similarly breezed through the App Store acceptance process and
8 Apple initially did not seek to hinder AliveCor in any meaningful way.

9 74. All of that changed, however, when AliveCor finally received FDA clearance on its
10 KardiaBand product and told Apple it was ready to imminently announce that product's release. As
11 previously discussed, Apple tried to undercut AliveCor publicly by suddenly pre-announcing its
12 heart initiative, which was a marked departure from Apple's typical policy of not pre-announcing
13 efforts like that. But, more insidiously, Apple also began to use its power over the watchOS
14 ecosystem to obstruct AliveCor's competitive opportunities.

15 75. Shortly after AliveCor released and began distributing SmartRhythm through the
16 App Store, Apple informed AliveCor that SmartRhythm allegedly violated various App Store
17 guidelines. This was the same app that Apple previously accepted for distribution without
18 objection—a decision that meant Apple believed the app complied with all applicable guidelines.
19 Nevertheless, Apple suddenly found “problems” with the app that it demanded AliveCor “fix,” else
20 face expulsion from the App Store. Given that Apple had positioned itself as the sole distributor for
21 watchOS apps—a practice that is the focus of other, currently-pending antitrust lawsuits—AliveCor
22 had no choice but to comply with Apple's demands. If it did not, then AliveCor faced exclusion
23 from its entire core market.

24 76. Over the next several weeks and months, AliveCor made several rounds of changes
25 to SmartRhythm to accommodate Apple's complaints and went back and forth with Apple multiple
26 times over these changes. It soon became clear that Apple's concerns were largely pretextual. For
27 example, Apple complained that SmartRhythm utilized the Watch's “workout mode,” which was
28 supposedly problematic because SmartRhythm was not a workout app. (SmartRhythm operated in

1 “workout mode” to access the Watch’s heartrate algorithm, which was a critical input for monitoring
 2 a user’s heartrate, in an uninterrupted manner.) When AliveCor pointed out there was no rule against
 3 doing so, Apple just rewrote the App Store guidelines to include a rule against using workout mode.
 4 Other complaints were similarly baseless and confusing, but AliveCor, having no choice, worked to
 5 satisfy Apple in each instance.²⁸²⁶

6 77. Eventually, Apple appeared to run out of pretextual complaints, because, several
 7 months in, it finally conceded that the updated SmartRhythm complied with all App Store
 8 guidelines. In this respect, AliveCor was lucky. Apple’s practice of mining an innovator for details
 9 about their product and then excluding the competitor from the Apple ecosystem is so common that
 10 it has obtained a nickname, “sherlocking”—so named from the first-known instance of this Apple
 11 tactic, which involved Apple’s Sherlock tool in the early 2000s.²⁹

12 78. Parallel to and after these discussions, Apple also began making undocumented
 13 changes to watchOS that would suddenly create massive technical problems for SmartRhythm.
 14 These changes were, on information and belief, little acts of sabotage Apple used to manufacture
 15 technical problems with SmartRhythm, such that it became “buggy” at inopportune times. The
 16 changes most often included sudden, undocumented modifications to the permissions the app had
 17 to different aspects of watchOS or the hardware and were of the type that, if typical practice held,
 18 would have been documented in release updates ahead of time, so AliveCor could update
 19 SmartRhythm to adjust for them. By releasing these changes without documentation, Apple made
 20 it so SmartRhythm would just suddenly not work, requiring AliveCor (multiple times over the period
 21 of months) to suddenly drop all else to fix the app, typically within hours or a day. Given
 22 SmartRhythm’s medical nature, such manufactured outages were not only damaging to AliveCor’s

25 ²⁸ Of course, all of these discussions proceeded under the cloud that Apple had pre-
 26 announced its heart initiative and was at some point soon likely to announce its own heart-focused
 apps on the Apple Watch.

27 ²⁹ [https://appleinsider.com/articles/19/06/06/developers-talk-about-being-sherlocked-as-](https://appleinsider.com/articles/19/06/06/developers-talk-about-being-sherlocked-as-apple-uses-them-for-market-research)
 28 [apple-uses-them-for-market-research](https://appleinsider.com/articles/19/06/06/developers-talk-about-being-sherlocked-as-apple-uses-them-for-market-research)

1 brand; they were potentially life threatening to its users, who used the app along with KardiaBand
2 to monitor their hearts.

3 79. But, despite all of these initial efforts to hamper its success, AliveCor persisted. Each
4 time Apple threw it a curveball, AliveCor adapted by updating SmartRhythm. That allowed
5 AliveCor to keep providing the heart health monitoring its innovations enabled on the Apple Watch,
6 at a time when Apple clearly had no competitive product available. That changed, however, with
7 Apple's update to watchOS5.

8 80. As the name implies, a heartrate analysis app requires access to the user's heartrate.
9 On the Apple Watch, Apple utilizes an algorithm to convert readings taken from the device's
10 photoplethysmography ("PPG") sensors into a reported heartrate. Apple does not permit third party
11 developers access to the data from the PPG sensors directly, so they must use the heartrate algorithm
12 for anything heartrate-related. This complicates third parties' task somewhat, because raw data from
13 the PPG sensors would be much more useful for heartrate-related tasks, but they have made do,
14 since those are restrictions Apple places on their use of the Apple Watch device.

15 81. For the first four overarching versions of watchOS, the heartrate algorithm stayed
16 roughly the same, and was in fact quite good at estimating a user's heartrate. Although the full
17 technical details are not necessary for this complaint, the most relevant points to understand about
18 the initial version of the heartrate algorithm are that it reported spikes and dips in heartrate and,
19 more importantly, reported heartrate in an irregular fashion if the user's heartrate was in fact
20 generating erratic data. For example, if a user's heart beat quickly for two seconds, then slow for
21 seven seconds, then beat quickly again for three seconds, the watchOS1-OS4 version of the heartrate
22 algorithm would report heartrates in roughly similar bursts.

23 82. One of AliveCor's innovations was to train SmartRhythm how to assess when these
24 irregularities likely indicated the user should record an ECG to check on their heart health. Even
25 though raw PPG data would have been better for this task, the initial version of the heartrate
26 algorithm on watchOS1-OS4 provided enough information on when heartrates were irregular, along
27 with enough data about the actual spikes and dips in heartrates, that SmartRhythm was able to
28 accurately predict conditions like atrial fibrillation ("AFib") (which the user could confirm by

1 recording an ECG via the KardiaBand) over 95% of the time. It was this accuracy that helped
2 catapult AliveCor to the forefront of heartrate analysis on wearable devices and which indicated to
3 Apple how valuable this sort of analysis could be to smartwatch users.

4 83. In September 2018, Apple released its Series 4 Apple Watch, which included the
5 ability to record an ECG standard on the device. The Series 4 Apple Watch also (for the first time
6 ever) included an Apple-developed heartrate analysis app that not only indicated when a user should
7 consider taking an ECG reading, but also was FDA-cleared to provide diagnoses of heart conditions
8 such as AFib. On information and belief, Apple was able to provide this diagnostic aspect to its
9 heartrate analysis app because, unlike with competitors, it granted itself full access to the raw data
10 from the device's PPG sensors.³⁰

11 84. Although this new competition was skewed in Apple's favor (given that Apple made
12 its heartrate analysis app and ECG reading functionality defaults on the Apple Watch), AliveCor
13 could have continued to compete but for a simultaneous change Apple made to watchOS, the fifth
14 version of which it released with the Apple Watch Series 4 (and which preexisting Apple Watch
15 owners were able to implement on their Series 1-3 devices). That update effectively killed all
16 competition for heartrate analysis apps on the Apple Watch by changing the heartrate algorithm in
17 two core ways that sabotaged all existing and potential third party competition.

18 85. The first change watchOS5 made to the heartrate algorithm was to "smooth"
19 heartrate data so that it reported irregular heartrates with far less frequency. By smoothing the
20 heartrate in this way (but not imposing the same limitation on itself), Apple made it so third party
21 developers were less able to detect the sorts of heartrate fluctuations that could indicate heart
22 problems and were thus less able to provide meaningful medical analysis for users. This
23 surreptitiously reduced the quality of Apple's competitors' offerings.

24 86. The second change was to report heartrate on a consistent basis without variation—
25 approximately every five seconds. To a lay person, such a change might appear innocuous, but its

26
27 ³⁰ AliveCor's review of Apple's submissions to the FDA also indicates that Apple misled the
28 FDA regarding the accuracy of its app's diagnoses, thus paving the way to clearance on sham
submissions.

1 real (and only) effect was to completely sabotage competing products. As previously noted, one of
2 the key indicators of heart problems is *irregularities*, which can include, *inter alia*, erratic beat
3 patterns, unexpected changes in the speed of beats, and a heartrate that is clearly out of sync with
4 one's activity levels. The way to detect such irregularities is to report them as they occur; *i.e.*, on a
5 basis that is just as irregular as the irregularities themselves. By changing the heartrate algorithm
6 to consistently report heartrate every five seconds, Apple made it so competing heartrate analysis
7 app providers could no longer detect irregularities and, thus, could not provide effective heartrate
8 analysis. This alone crippled apps like SmartRhythm.

9 87. As noted above, Apple did not similarly constrain itself. On information and belief
10 (which is substantiated by, *inter alia*, the fact that Apple was able to obtain FDA clearance for its
11 heartrate analysis app, meaning the app was deemed reliable enough to diagnose heart conditions),
12 Apple gave itself access to the raw data collected by the Apple Watch's PPG sensors. That data is
13 the best information available to detect and diagnose a user's heart problems, and to indicate to them
14 when they should take a confirmatory ECG. This meant that Apple had access to the best and most
15 suitable data, but changed watchOS to deprive third party developers of anything even remotely
16 resembling the same quality data. Thus, with a single update to watchOS—which, again, coincided
17 with Apple releasing the first version of the Apple Watch that came standard with the ability to
18 record an ECG—Apple eliminated all heartrate analysis competition on the Apple Watch. Indeed,
19 after trying to adapt SmartRhythm to the revised heartrate algorithm, AliveCor concluded that, at
20 best, it could only predict situations in which a user should take an ECG about 50% of the time.
21 Given that SmartRhythm was meant to alert those potentially suffering from a heart condition to
22 confirm that fact and seek medical advice as appropriate, AliveCor could not offer its users the
23 effective equivalent of a coin flip on that lifesaving task. AliveCor was therefore forced to pull
24 SmartRhythm from the market and, it understands, other heartrate analysis app competitors were
25 either forced to do the same or remove their heartrate analysis features and instead pivot to just
26 providing heartrate tracking.

27 88. Notably, the changes Apple made to the heartrate algorithm with watchOS5 were not
28 improvements. Users did not receive more accurate heartrate data as a result of the changes; nor

1 did they receive any other qualitative benefits. Indeed, Apple did not claim in its promotional
2 materials for the Series 4 Apple Watch that it had improved or otherwise changed the heartrate
3 algorithm; Apple instead focused on its new ECG reading capabilities and its heartrate analysis
4 app.³¹ Thus, Apple Watch Series 4 purchasers were not drawn to the purchase by any suggestions
5 that heartrate information was more accurate, or any other supposed improvement. This confirms
6 that the only real effect—and the clear intent—of the algorithm changes was to exclude competition.

7 89. These changes were also nefarious in that they did not just affect new Series 4 Apple
8 Watches, which came standard with watchOS5 and were the first—and, at that point, only—Apple
9 Watches to incorporate the ability to record ECGs through the Apple Watch hardware itself. Apple
10 also pushed the OS5 update wirelessly to Series 1-3 Watch users. If and when those users updated
11 to OS5 (which the vast majority of them did), it instantly sabotaged third party heartrate analysis
12 app providers on those devices, even though Apple could not itself provide the ability to record an
13 ECG on those devices. Apple thus made it so existing AliveCor users were unable to continue to
14 obtain reliable analyses from SmartRhythm, putting their health at risk, which was particularly
15 problematic given they were locked into their Apple Watch purchase for the reasons discussed above
16 (and, of course, could not have predicted that Apple would change policies with respect to third
17 party heartrate analysis apps in this way).

18 90. Given Apple's previous history of attempts to exclude AliveCor from the market
19 through complaints about App Store guidelines and more surreptitious, undocumented changes to
20 watchOS4, its simultaneous release of ECG functionality on the Series 4 Apple Watch, and the very
21 targeted nature of the watchOS5 heartrate algorithm changes, it was clear that Apple intended to
22 exclude competition through its OS update. And its adherence to those changes to this day confirms
23 its ongoing intent to exclude competition for heartrate analysis apps on the Apple Watch.

24 91. Unfortunately, Apple Watch users (and, more broadly, ECG-capable
25 smartwatch/wearable users) are unable to constrain Apple's anticompetitive activities in the relevant
26

27 ³¹ [https://www.apple.com/newsroom/2018/09/redesigned-apple-watch-series-4-](https://www.apple.com/newsroom/2018/09/redesigned-apple-watch-series-4-revolutionizes-communication-fitness-and-health/)
28 [revolutionizes-communication-fitness-and-health/](https://www.apple.com/newsroom/2018/09/redesigned-apple-watch-series-4-revolutionizes-communication-fitness-and-health/)

1 market (or aftermarket) for heartrate analysis apps because (a) much of Apple's behavior is behind
 2 the scenes and invisible to them; (b) they have little ability to learn about Apple's behavior before
 3 they make an Apple Watch purchase; (c) they become locked into their smartwatch purchase at the
 4 time of purchase, due to the cost, investment, and longevity of the purchase and associated service
 5 contract; and (d) they even become more locked into watchOS (and the broader Apple mobile device
 6 ecosystem) over time, for the reasons previously discussed. Similarly, watchOS app developers are
 7 unable to constrain Apple's anticompetitive activities because (a) they cannot control how Apple
 8 designs and updates watchOS, and (b) if they push back on it in any meaningful way, they risk being
 9 unable to sell into the watchOS app market at all. Accordingly, Apple's power has only grown over
 10 the heartrate analysis app market over time, and both Apple Watch users and developers are less
 11 and less able to act as a brake on Apple's power and anticompetitive activities.

12 92. Unfortunately, the inability to discipline Apple's misbehavior means that it has been
 13 able to harm competition and competitors in all-too-predictable ways. By excluding competing
 14 heartrate analysis app developers, Apple has, first and foremost, removed constraints on its pricing
 15 behavior, particularly given that it already had (and retains) monopoly power in the U.S. market for
 16 ECG-capable smartwatches (or, alternatively, the U.S. market for ECG-capable wearable devices
 17 and even the broader U.S. market for smartwatches). This has led to Apple imposing even higher
 18 prices for Apple Watches due to including its heartrate analysis app and associated hardware on the
 19 device without competition from third party developers.³² Apple has also used its anticompetitive
 20 exclusivity over health data on the Apple Watch to partner with large manufacturers and medical
 21 institutions in various health studies (including, notably, heart health studies),³³ which it presumably
 22 intends to use to monetize new products following research results from those studies. By limiting
 23 competitors' access to Apple Watch users, Apple has made it so those competitors cannot similarly

24 _____
 25 ³² Apple now uses its unchallenged heartrate analysis app as a central selling point for the
 26 Apple Watch, both for individual users and for doctors looking to make suggestions for ways for
 patients to monitor their heart health. *See* <https://www.apple.com/healthcare/apple-watch/>.

27 ³³ *See, e.g.*, [https://www.apple.com/newsroom/2019/09/apple-announces-three-](https://www.apple.com/newsroom/2019/09/apple-announces-three-groundbreaking-health-studies/)
 28 [groundbreaking-health-studies/](https://www.cnet.com/news/johnson-and-johnson-apple-team-up-on-new-ios-based-heart-study/); [https://www.cnet.com/news/johnson-and-johnson-apple-team-up-](https://www.cnet.com/news/johnson-and-johnson-apple-team-up-on-new-ios-based-heart-study/)
 on-new-ios-based-heart-study/.

1 partner with other interested researchers to proliferate and expand on health research generated from
2 wearable devices, thus decreasing output—the only research allowed now is that which Apple
3 permits, usually to its financial benefit above all else. Another anticompetitive effect of Apple’s
4 conduct is to reduce market output (including by, *inter alia*, reducing overall product quality in the
5 market), reduce market innovation, and plainly reduce watchOS user choice, despite obvious
6 demand for competition to Apple’s default heartrate analysis app. These negative competitive
7 effects impact competing developers and end users directly, because Apple is able to offer lower-
8 quality products at supracompetitive prices with impunity, and because it has no fear that doing so
9 will cause it to lose market share or power.

10 93. The facts and circumstances surrounding Apple’s imposition of its heartrate analysis
11 app on Apple Watch users, along with its sabotage and exclusion of competitors for the same type
12 of apps, also demonstrate there are no non-pretextual, procompetitive justifications for Apple’s
13 actions. As an initial matter, Apple’s change to the heartrate algorithm did not provide Apple Watch
14 users with any meaningful benefit; the heartrate algorithm still provided heartrate to a user in the
15 same way, but it changed the way it reported heartrate values to third party app developers. In other
16 words, the heartrate algorithm changes were not meant to provide users with a better product, but
17 simply to damage competition. Moreover, Apple’s heartrate analysis app is just not as good as
18 AliveCor’s for detecting potentially worrisome heart-related events. Users needing or wanting such
19 functionality of course want the option to select the best-quality heartrate analysis available. By
20 excluding competitors, Apple acted in an inherently *anticompetitive* way by depriving users of this
21 choice without providing any offsetting benefits. Indeed, Apple has never offered any sort of
22 justification for its exclusionary practices, and any such justification now would be wholly made for
23 litigation purposes.

24 94. But for Apple’s restrictions, would-be competitors, such as AliveCor, could provide
25 consumers choice beyond Apple’s own heartrate analysis app and inject healthy competition into
26 the market. These apps could compete on the basis of (among other things) quality, price, service,
27 and innovation. Competitors could innovate by (among other things) offering different or better
28

1 heartrate analyses than Apple, providing more reliable heartrate analyses, or offering ways to better
2 tailor the Apple Watch for their personal health analysis needs.

3 **C. APPLE ATTEMPTS TO FINISH ITS ANTICOMPETITIVE MISSION**
4 **THROUGH A SCHEME OF VEXATIOUS LITIGATION**

5 95. Faced with this lawsuit and AliveCor's parallel allegations that Apple Watches
6 incorporating the ECG App, high heart notification feature, and irregular heartrate notification
7 feature infringe certain of AliveCor's patents, Apple has weaponized the judicial and administrative
8 process to attempt to extend its monopolistic control over the relevant market. These vexatious
9 proceedings are aimed at bleeding AliveCor dry and threaten to finish the job Apple's aftermarket
10 monopolization already began by once and for all eliminating AliveCor from the market.

11 96. In response to the anticompetitive conduct described above, AliveCor developed
12 new, innovative technology that pivoted to other form factors and use cases (*e.g.*, are usable with
13 other types of devices besides an Apple Watch). It did so in order to survive as a company, and
14 because that is what AliveCor does—it innovates. One such product is the KardiaMobile Card.³⁴
15 The KardiaMobile Card allows users to take a personal ECG using a card the size of a credit card.
16 The card then sends a signal to the user's phone, where Kardia App uses artificial intelligence ("AI")
17 to process the data and provide the user with near instantaneous classification of their ECG. The
18 KardiaMobile Card is FDA-cleared to detect AFib and other irregularities. The product is pictured
19 below.
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25
26
27

28 ³⁴ <https://store.kardia.com/products/kardiamobile-card>.



97. Unlike SmartRhythm, the KardiaMobile Card cannot notify users of an irregular heartrate in real time. Whereas SmartRhythm was (and Apple's IRN is) effectively always active, the KardiaMobile Card is user-directed. The product therefore serves a different, but related function to SmartRhythm, more akin to the ECG functionality AliveCor's KardiaBand first enabled on Apple Watch, and which Apple copied and now employs by default on all new Apple Watch Series. Thus, the KardiaMobile Card exists in a separate, but related market from the watchOS heartrate analysis market described above.

98. In response to this lawsuit, Apple decided that the best way to defend itself was not to address the merits of AliveCor's claims, but to attack this other example of innovative AliveCor technology so that AliveCor had to expend precious resources protecting that portion of its business rather than devoting full resources to pursuing its antitrust and other claims against Apple. Apple therefore began implementing a vexatious litigation campaign to stifle innovation and crush

1 AliveCor, with no regard for the success of that litigation and instead with the sole intent of raising
 2 AliveCor's costs in an effort to make AliveCor buckle under the weight of litigation expenses.
 3 Specifically, Apple has filed five petitions for *inter partes* review ("IPRs") against AliveCor's
 4 technology, including two IPRs against KardiaMobile Card technology, and three against inventions
 5 relating to the wireless, subsonic transmission of ECG data to a phone or other personal computing
 6 device that analyzes the data including. Collectively, the IPRs are against Patent Nos. 8,509,882
 7 (April 27, 2022); 10,342,444 (April 27, 2022); 11,103,175 (June 23, 2022); 9,649,042 (July 15,
 8 2022); and 8,301,232 (July 22, 2022) (collectively, "Anticompetitive IPRs"). Apple does not market
 9 or sell anything similar to KardiaMobile Card and, on information and belief, Apple has no plans to
 10 do so. These IPRs are solely meant to kill AliveCor's business and directly attack the company for
 11 having the audacity to highlight and pursue claims against Apple for antitrust violations and Apple's
 12 theft of AliveCor's patented technology.

13 99. IPRs are an administrative proceeding that allows third parties to challenge the
 14 patentability of one or more claims within a patent.³⁵ Generally, IPRs are "defensive" in that the
 15 third party challenging the patentability of claims of a patent asserted against them in a parallel
 16 lawsuit or proceeding. This fact is contemplated by the patent statute itself, which provides that
 17 IPRs may not be instituted if the petitioning party was served with a complaint alleging infringement
 18 of the patent "more than 1 year" before such IPR filing date. 35 U.S.C. § 315(b). And although
 19 administrative proceedings before the Patent Office do not impose a standing requirement,
 20 unsuccessful IPR petitioners not accused of infringing or contemplating future infringement of the
 21 challenged patents are precluded from bringing appeals before the Court of Appeals for the Federal
 22 Circuit because they lack Article III standing. *See AVX Corp. v. Presidio Components, Inc.*, 923
 23 F.3d 1357, 1367 (Fed. Cir. 2019) (dismissing IPR appeal for lack of Art. III standing); *Phigenix,*
 24 *Inc. v. Immunogen, Inc.*, 845 F.3d 1168, 1175-76 (Fed. Cir. 2017) (holding that the estoppel
 25 provision of § 315(e) prohibiting IPR petitioners from later bringing future invalidity proceedings
 26 against the challenged patent "do[es] not constitute an injury in fact" because appellant "is not

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 28 ³⁵ See 35 U.S.C. § 311; see also <https://www.uspto.gov/patents/ptab/trials/inter-partes-review>

1 engaged in any activity that would give rise to a possible infringement suit”). The strategic value
2 of filing an IPR therefore typically relates to the merits of a parallel lawsuit, where the challenger is
3 being accused of infringing the subject patent being challenged in the IPR. Alternatively, third
4 parties may benefit from filing an IPR if the patent at issue has some blocking capability for
5 technology that the applicant wishes to use, or for products that it wishes to use.

6 100. Each of the Anticompetitive IPRs relates to different aspects or components of the
7 KardiaMobile Card. None relates to the patents AliveCor asserted against Apple in its parallel
8 infringement actions, and none relate to heartrate analysis apps. Rather, each relates to patents
9 AliveCor has not asserted against Apple. On information and belief, Apple does not practice any
10 related technology, nor is Apple poised to develop their own ECG-capable card. The purpose of
11 these IPRs therefore does not relate to the merits of any parallel litigation or technology Apple
12 wishes to use, but instead is solely designed to drive up AliveCor’s litigation costs.

13 101. Increased litigation costs divert crucial funding away from competition on the merits.
14 AliveCor is less able to spend money and time on innovating, developing new technologies, and
15 expanding output on its existing products, and it is unable to reduce prices for consumers.

16 102. Nor, on information and belief, does Apple care at all whether these IPRs are
17 meritorious—their value is not in the end result, but in the money they force AliveCor to expend
18 and the threat they represent to AliveCor’s continued efforts vis-à-vis this civil action to bring Apple
19 to task for anticompetitively killing competition for heartrate analysis apps. By filing a new IPR
20 every few weeks, Apple continues to squeeze the vice on AliveCor and to threaten its other lines of
21 business simply because AliveCor chose to fight back against Apple’s anticompetitive behavior and
22 its theft of AliveCor’s patented technology. To a two-and-a-half trillion dollar company like Apple,
23 ever-expanding IPR costs are a rounding error; to a small company that Apple already once hobbled,
24 these costs are existential. The IPRs also seek to remove all protection for AliveCor’s other
25 innovative technologies, thus representing an attempt to destroy the company’s value because it
26 dared challenge Apple’s wrongful conduct.

27 103. Furthermore, the Anticompetitive IPRs do more than impose costs on AliveCor and
28 threaten its already-diminished existence; they serve as a signal from Apple to its active and nascent

1 competitors: “do not challenge us, or else.” Apple’s vexatious litigation campaign against AliveCor
2 is thus a warning to would-be entrants, therefore increasing the barriers to new entry in both the
3 market for watchOS heartrate analysis apps and any other markets for watchOS apps or health
4 features that Apple wishes to own.

5 104. Nor is AliveCor the only competitor against whom Apple is employing this
6 anticompetitive scheme. Masimo Corporation (“Masimo”) is a global medical technology company
7 that develops and sells consumer health products, particularly pulse oximetry technology.³⁶ Masimo
8 also initiated an ITC investigation against Apple relating to Apple’s infringement of Masimo’s heart
9 health-related patents on the Apple Watch. Apple recently filed several IPRs against Masimo on
10 July 15, 2022. Although these IPRs relate to the patents in the Masimo-Apple ITC proceeding, the
11 IPRs were filed *after* post-hearing briefing in the ITC concluded and shortly before an initial
12 determination is expected from the ALJ there. Even assuming Apple’s IPRs against Masimo’s
13 patents are instituted, they would not reach final written decisions until 15 months from their
14 filing—nearly one full year after the Commission will have rendered its final determination in their
15 investigation. Thus, the IPRs serve no defensive value and are merely designed to impose added
16 costs on Masimo, just like with AliveCor. Apple’s playbook is simple: steal a smaller competitor’s
17 innovative technology; litigate the innovator to death; profit at the expense of consumers. It does
18 not care whether it invalidates any aspect of its competitors’ patents; what matters is that it can use
19 its unlimited war chest to force them into submission simply because they asked that Apple be held
20 accountable for breaking the law.

21 105. Indeed, Apple has already demonstrated *in this lawsuit* that the Anticompetitive IPRs
22 are motivated by anticompetitive intent and are causally linked to its earlier, independent
23 anticompetitive acts. In an attempt to stifle this litigation, Apple filed a counterclaim demanding
24 that AliveCor “indemnify” Apple for legal costs Apple incurs in defending this very lawsuit. This
25 Court saw through that ruse (Dkt. 56), marking the second time Apple failed to force a victim of its
26 anticompetitive conduct to pay its legal fees simply because they have the audacity to point out and
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28 ³⁶ See <https://www.masimopersonalhealth.com/>.

1 litigate Apple's illegal behavior. *See Epic Games, Inc. v. Apple Inc.*, 559 F. Supp. 3d 898, 1065-
 2 1067 (N.D. Cal. 2021). The strategy is clear: force AliveCor into submission not by defending its
 3 claims on the merits, but by imposing huge costs on the company that it cannot bear. When Apple's
 4 counterclaim failed, it then turned to the Anticompetitive IPRs, and it is those IPRs it now seeks to
 5 vexatiously use the PTAB to finish the job that its original aftermarket monopolization started.

6 106. To put a finer point on this discussion, the KardiaMobile IPRs are inextricably linked
 7 to Apple's original anticompetitive change to watchOS's heartrate algorithm. As alleged above,
 8 Apple made that change to eliminate AliveCor and any other heartrate analysis app providers as
 9 competitors. Now, it brings the KardiaMobile IPRs to further render AliveCor or any other company
 10 incapable of acting as a competitor—Apple does not care whether it wins the IPRs, but rather what
 11 the cost of defending IPR after IPR does to irreversibly damage a competitor that it independently
 12 hobbled through its control over watchOS. And at the defense cost of hundreds of thousands of
 13 dollars, minimum, per IPR, not many companies could withstand such an onslaught. Apple's
 14 unfounded actions, brought as part of and in furtherance of a combination of its other
 15 anticompetitive conduct, impinge competition at large and further damage AliveCor.

16 **INTERSTATE TRADE AND COMMERCE**

17 107. Apple's conduct has taken place in and affected the continuous flow of interstate
 18 trade and commerce of the United States, in that, *inter alia*:

19 (a) Apple has provided heartrate analysis apps on Apple Watches throughout the
 20 United States;

21 (b) Apple has used instrumentalities of interstate commerce to provide heartrate
 22 analysis apps on Apple Watches throughout the United States;

23 (c) In furtherance of the anticompetitive scheme alleged herein, Apple
 24 employees have traveled between states and have exchanged communications through interstate
 25 wire communications and via U.S. mail; and

26 (d) The anticompetitive scheme alleged herein has affected billions of dollars of
 27 commerce. Apple has inflicted antitrust injury by artificially excluding AliveCor and other
 28 competitors and causing the other antitrust injuries described herein.

COUNT I

Sherman Act Section 2 – Monopolization (15 U.S.C. § 2)

108. The foregoing paragraphs are incorporated by reference as though fully set forth herein.

109. Apple has willfully acquired and maintained monopoly power in the relevant market for watchOS heartrate analysis apps or, in the alternative, heartrate analysis apps for wearable devices.

110. Apple possesses monopoly power in the relevant market for watchOS heartrate analysis apps or, in the alternative, heartrate analysis apps for wearable devices.

111. Apple has nearly 100% market share in the relevant market for watchOS heartrate analysis apps, and at least 70% market share in the alternative relevant market for heartrate analysis apps for wearable devices.

112. Apple has willfully acquired and maintained monopoly power in the relevant market, by means of predatory, exclusionary, and anticompetitive conduct, including but not limited to technological tying arrangements / exclusionary design changes, “implicit” tying arrangements, aftermarket monopolization, raising rivals’ costs, leveraging, and vexatious litigation casually connected to the independent anticompetitive harms Apple has caused AliveCor, as alleged herein.

Technological tying / exclusionary design changes

113. Apple Watches are sold in the U.S. ECG-capable smartwatch market (or, in the alternative, the U.S. ECG-capable wearable devices markets or U.S. smartwatch market), but, as described above, Apple obtains lock-in monopoly power over Apple Watch users once they select an Apple Watch for purchase.

114. Apple has sufficient economic power over ECG-capable smartwatches (or, in the alternative, ECG-capable wearable devices or smartwatches in general) to enable it to restrain trade in the relevant market for watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

1 115. Apple has sufficient economic power over locked-in Apple Watch users to enable it
2 to restrain trade in the relevant market for watchOS heartrate analysis apps (or, in the alternative,
3 heartrate analysis apps for wearable devices).

4 116. Apple implemented design changes to watchOS that were not improvements, but
5 were instead meant to, and did, exclude competition in the relevant market for watchOS heartrate
6 analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

7 117. Apple's conduct has affected a not insubstantial amount of interstate commerce in
8 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

9 118. Apple's conduct has had an anticompetitive effect in the relevant market for
10 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

11 "Implicit" tying arrangements

12 119. Apple Watches are sold in the U.S. ECG-capable smartwatch market (or, in the
13 alternative, the U.S. ECG-capable wearable devices markets or U.S. smartwatch market), but, as
14 described above, Apple obtains lock-in monopoly power over Apple Watch users once they select
15 an Apple Watch for purchase.

16 120. Apple Watches and heartrate analysis apps are two separate services or products, or,
17 in the alternative, complementary products.

18 121. Apple has implicitly conditioned the sale of an Apple Watch to the use of its heartrate
19 analysis app.

20 122. Apple has implicitly conditioned the use of an Apple Watch to the user not using a
21 third party developer's heartrate analysis app.

22 123. Apple has sufficient economic power over ECG-capable smartwatches (or, in the
23 alternative, ECG-capable wearable devices or smartwatches in general) to enable it to restrain trade
24 in the relevant market for watchOS heartrate analysis apps (or, in the alternative, heartrate analysis
25 apps for wearable devices).

26 124. Apple has sufficient economic power over locked-in Apple Watch users to enable it
27 to restrain trade in the relevant market for watchOS heartrate analysis apps (or, in the alternative,
28 heartrate analysis apps for wearable devices).

1 125. Apple's conduct has affected a not insubstantial amount of interstate commerce in
2 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

3 126. Apple's conduct has had an anticompetitive effect in the relevant market for
4 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

5 Aftermarket monopolization

6 127. Due to the information and switching costs described above, Apple Watch purchasers
7 become locked in to their purchase after making their initial purchase, and then become more locked
8 into the watchOS and broader Apple mobile device ecosystem over time.

9 128. Once users were locked into watchOS devices and the Apple mobile device
10 ecosystem, Apple utilized the power that lock-in conferred in order to exclude competition in the
11 relevant market (or aftermarket) for watchOS heartrate analysis apps or, in the alternative, relevant
12 market (or aftermarket) for heartrate analysis apps for wearable devices.

13 129. Apple's actions, based on the lock-in it obtained has impeded its competitors' ability
14 to compete in the relevant market (or aftermarket) for watchOS heartrate analysis apps or, in the
15 alternative, relevant market (or aftermarket) for heartrate analysis apps for wearable devices.

16 Raising rivals' costs

17 130. Apple has monopoly power in the U.S. ECG-capable smartwatch market (or, in the
18 alternative, the U.S. ECG-capable wearable devices markets or U.S. smartwatch market).

19 131. Apple obtains lock-in monopoly power over Apple Watch users once they select an
20 Apple Watch for purchase.

21 132. By changing watchOS's heartrate algorithm to prevent accurate reporting of
22 irregularities in a user's heartrate to a third party developer, Apple raised those competitors' costs
23 to do business. It did so by completely preventing them from obtaining the data they needed to
24 provide heartrate analysis reliably on the Apple Watch.

25 133. Apple's heartrate analysis app competitors had no choice in the face of their raised
26 costs (*i.e.*, the dramatic reduction in the quality of their services) but to either substantially reduce
27 the scope or quality of their app's services/functionality, or cease providing their app entirely.
28

1 134. Apple's conduct has affected a not insubstantial amount of interstate commerce in
2 the relevant market for watchOS heartrate analysis apps (or, in the alternative, heartrate analysis
3 apps for wearable devices).

4 135. Apple's conduct has had an anticompetitive effect in the relevant market for
5 watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for wearable devices).

6 Leveraging

7 136. Apple has monopoly power over locked-in Apple Watch users, as well as monopoly
8 power in the U.S. ECG-capable smartwatch market (or, in the alternative, the U.S. ECG-capable
9 wearable devices markets or U.S. smartwatch market).

10 137. Apple has used its lock-in monopoly power over Apple Watch users in a predatory,
11 exclusionary, and anticompetitive manner to monopolize the relevant market for watchOS heartrate
12 analysis apps (or, in the alternative, heartrate analysis apps for wearable devices), and its monopoly
13 power in the U.S. ECG-capable smartwatch market (or, in the alternative, the U.S. ECG-capable
14 wearable devices markets or U.S. smartwatch market) in a predatory, exclusionary, and
15 anticompetitive manner to monopolize the relevant market for watchOS heartrate analysis apps (or,
16 in the alternative, heartrate analysis apps for wearable devices).

17 138. Apple's conduct is not justified, because its conduct is not intended to enhance
18 overall efficiency and to make the relevant markets more efficient.

19 139. Apple's conduct has had a substantial effect on interstate commerce.

20 140. AliveCor has been or will be injured in its property as a result of Apple's conduct.

21 141. AliveCor has suffered and will suffer injury of the type that the antitrust laws were
22 intended to prevent. AliveCor has been and will be injured by the harm to competition as a result
23 of Apple's conduct.

24 Anticompetitive scheme of lawsuits, claims, and administrative proceedings

25 142. Apple Watches are sold in the U.S. smartwatch market (or, in the alternative, the
26 U.S. ECG-capable smartwatch market or U.S. ECG-capable wearable devices market), but, as
27 described above, Apple obtains monopoly power over Apple Watch users once they select an Apple
28 Watch for purchase.

1 143. Apple has sufficient economic power to enable it to restrain trade in the relevant
2 market for watchOS heartrate analysis apps (or, in the alternative, heartrate analysis apps for
3 wearable devices).

4 144. Moreover, Apple has sufficient economic power over locked-in Apple Watch users
5 to enable it to restrain trade in the relevant market for watchOS heartrate analysis apps (or, in the
6 alternative, heartrate analysis apps for wearable devices).

7 145. In connection with its other anticompetitive conduct causing independent harm to
8 competition and to AliveCor, Apple has engaged in a scheme, pattern, or practice of filing lawsuits,
9 claims, and administrative proceedings without regard to their merit in order to further its broader
10 anticompetitive campaign. These include: (i) Petition for *Inter Partes* Review of United States
11 Patent No. 8,509,882 Pursuant to 35 U.S.C. §§ 311-319, 37 C.F.R. § 42; (ii) Petition for *Inter Partes*
12 Review of United States Patent No. 10,342,444 Pursuant to 35 U.S.C. §§ 311-319, 37 C.F.R. § 42;
13 (iii) Petition for *Inter Partes* Review of United States Patent No. 11,103,175B2 Pursuant to 35
14 U.S.C. §§ 311-319, 37 C.F.R. § 42; (iv) Petition for *Inter Partes* Review of United States Patent
15 No. 9,649,042 Pursuant to 35 U.S.C. §§ 311-319, 37 C.F.R. § 42; and (v) Petition for *Inter Partes*
16 Review of United States Patent No. 8,301,232 Pursuant to 35 U.S.C. §§ 311-319, 37 C.F.R. § 42.

17 146. These lawsuits, claims, and administrative proceedings are causally connected with
18 Apple's broader anticompetitive campaign. On information and belief, given that it does not
19 practice the technology in question, the only reason Apple initiated the KardiaMobile IPRs is
20 because it wishes to raise AliveCor's costs and fully eliminate AliveCor from the market as an
21 operating company, because Apple was unable to fully eliminate it before with the change to its
22 heartrate algorithm. Apple's litigation scheme also seeks to deter nascent or potential competitors
23 in the market for watchOS heartrate analysis apps by signaling that any attempted entry or
24 complaints regarding Apple's anticompetitive behavior—specifically, its ability to change
25 algorithms on watchOS at will to kill competition—will be met with numerous lawsuits that are
26 existential to a company not because of their merit, but because they are an unceasing tide to drown
27 out the competitor's resources.

28

1 (g) Injunctive relief, including but not limited to an injunction barring
2 Apple's conduct alleged in the Complaint;

3 (h) Declaratory relief, including but not limited to a declaration and
4 judgment that Apple's conduct alleged in the Complaint violates the laws alleged in the
5 Complaint; and

6 (i) Such other and further relief as the Court deems proper and just.

7 **DEMAND FOR JURY TRIAL**

8 Pursuant to Rule 38(a) of the Federal Rules of Civil Procedure, AliveCor demands a jury
9 trial as to all issues triable by a jury.

10 DATED: October 19, 2022

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